

with oil, as in our Navy, or by coal-dust, as used by the Germans.

Working the guns with the ships at full speed, as I have just stated, will be an additional protection, while submarine craft will be more dangerous operating against fixed objects, such as harbour defences, etc., in which case they could be detected from the shore by submarine listening devices, such as my liquid microphone.

In closing this discourse, I should like to say that a good deal of credit is due to Anschütz for the courage he displayed in being the first to attempt a gyro-compass, knowing as he did the extremely feeble force that is likely to result from the earth's rotation, and in the fact that the instrument must be carried on a rolling pitching, plunging vessel. With us who follow it is a question over again of Columbus and the egg. For myself, if I had known at the commencement of my acquaintance with the gyro-compass—some five years ago—all the difficulties that had to be encountered, I think I should have abandoned the pursuit.

Notes.

At the meeting of the Royal Society on June 3 the Bakerian lecture will be delivered by Sir Ernest Rutherford on "The Nuclear Constitution of the Atom."

SIR JAMES DEWAR has been elected a corresponding member of the French Academy of Sciences in the section of general physics in succession to the late Prof. P. Blaserna.

THE Institute of Research in Animal Nutrition at Aberdeen has received a gift of 10,000*l.* from Mr. J. Q. Rowett. The amount required from public sources for the establishment of the institution is 25,000*l.*

MR. A. A. CAMPBELL SWINTON, during his presidential address to the Wireless Society of London on February 28, reviewed, with the aid of experiments, advances in wireless telegraphy since 1914, and received, in full view of the audience, messages from Gen. Ferrié in Paris and from the Slough station of the Radio Communication Co. These messages were received, not on the usual external aerial, but on a simple loop of wire standing on the lecture-table.

In the course of a speech at a Conference of Provincial and Suburban Wireless Societies, held on February 27 under the presidency of Sir Charles Bright, Capt. F. C. Loring announced that the Post Office is in favour of granting wireless licences of about 10 watts where an amateur can prove that he thoroughly understands the apparatus and is a proficient operator, and that his transmitting station is to be used for genuine experimental work and not merely for communication between other stations in a general way.

WE are officially informed that Dr. Carlos Ameghino has been appointed director of the National Museum of Natural History, Buenos Aires, in succession to Dr. Angel Gallardo, who retired in 1916 to become Minister of Education. The new director is the younger brother of the late Dr. Florentino Ameghino,

the distinguished palæontologist, who held the same office from 1902 until his death in 1911. During the earlier part of his career Dr. Carlos Ameghino explored many parts of Patagonia and made the great collections of fossil vertebrate remains which were studied and described by his brother. During recent years he has been interested in the evidence for the association of man with extinct mammals in Argentina.

THE council of the Linnean Society has issued to the fellows a statement of the present financial position and outlook of the society, recommending them to increase the annual contribution from 3*l.* to 4*l.* The cost of publication is now so high that the Transactions have already been suspended, and the Journal is so much reduced that the issue of many valuable papers has to be postponed for an indefinite time. The due maintenance of the library and the preparation of an up-to-date catalogue are impossible in existing circumstances, and all establishment charges still tend to rise. If the difficulties appeared to be temporary some of the small invested funds of the society might be used, but as there is no prospect of a return to former conditions an increased income is absolutely essential. Nearly all the learned societies are at present faced with similar problems, and the time seems to have arrived when there should be some action in common to consider the possibility of help from public funds.

THE following are among the lecture arrangements at the Royal Institution after Easter:—Major G. W. C. Kaye, two lectures on recent advances in X-ray work; Prof. Arthur Keith, four lectures on British ethnology: *The Invaders of England*; Major C. E. Inglis, two lectures on the evolution of large bridge construction; Mr. Sidney Skinner, two lectures on (1) *Ebullition and Evaporation*, (2) *The Tensile Strength of Liquids*; Mr. R. Campbell Thompson, two lectures on (1) *The Origins of the Dwellers in Mesopotamia*, and (2) *The Legends of the Babylonians*; Mr. A. P. Graves, two lectures on Welsh and Irish folk-song (with musical illustrations); Prof. W. H. Eccles, two lectures on the thermionic vacuum tube as detector, amplifier, and generator of electrical oscillations; Prof. Frederic Harrison, two lectures on (1) *A Philosophical Synthesis as Proposed by Auguste Comte*, and (2) *The Reaction and the Critics of the Positivist School of Thought*; and Prof. J. H. Jeans, two lectures on recent revolutions in physical science, (1) *The Theory of Relativity*, and (2) *The Theory of Quanta* (the Tyndall lectures). The Friday evening meetings will be resumed on April 16, when Prof. J. A. McClelland will deliver a discourse on ions and nuclei. Succeeding discourses will probably be given by Prof. H. Maxwell Lefroy, Prof. F. O. Bower, the Right Hon. Lord Rayleigh, Prof. Karl Pearson, Prof. J. A. Fleming, Prof. W. L. Bragg, and other gentlemen.

ONE of the Industrial Research Associations formed in connection with the Department of Scientific and Industrial Research is the British Empire Sugar Research Association. If the association plans its

work on a sufficiently large scale, and raises 5000l. a year from the trade for five years, grants of the same amount and for the same period will be made from State funds. The offices of the association are in Evelyn House, 62 Oxford Street, W.1. The objects of the association are to establish, in co-operation with the Department of Scientific and Industrial Research, an Empire scheme for the scientific investigation, either by its own officers or by universities, technical schools, and other institutions, of the problems arising in the sugar industry, and also to encourage and improve the technical education of persons who are or may be engaged in the industry. A survey is being made of the field of research which is likely to be beneficial to the industry, and it is proposed to establish a bureau of information to which any member of the association can apply for assistance. In the first instance, the whole of the research undertaken will be carried out in existing institutions, and it will be necessary to enter into agreements with the bodies controlling these institutions for the use of laboratories and the services of skilled scientific investigators. With regard to the actual production of sugar, experiments on the cultivation of the sugar-cane and of the sugar-beet will be undertaken in suitable parts of the Empire. In this connection it is hoped that very close relations will be established with Colonial Agricultural Departments. The organisation and general supervision of the research work will eventually be entrusted to a director of research, and it is hoped to establish a Central Sugar Research Institute if and when it becomes necessary.

In Algeria most gun-owners are able to trim roughly the flints they require for the long-barrelled muzzle-loading guns and pistols which still form the principal armament of the nation. Mr. M. W. Hilton-Simpson, while engaged in collecting specimens for the Pitt-Rivers Museum, Oxford, came across a specialist who trimmed flints for sale. This worker's methods are fully described in the March issue of *Man*. He employed a rough stone for striking the flakes from the cone, and for trimming the flakes thus struck off he used a small tool resembling in outline the universal general-utility implement of the country, a combination of a hoe and pick. This man's features indicate an infusion of negro blood, but flint-chipping does not seem to be a special negro trade, the man being a resident of one of the oases where there is a negro strain in the population.

Of the eighteen species of ground-squirrels found in the State of California, four, inhabiting cultivated areas, have become pests. The life-histories of these four and of the harmless species have been very carefully described by Messrs. Joseph Grinnell and Joseph Dixon in vol. vii. of the Monthly Bulletin of the State Commission of Horticulture. In one district infested by the Oregon ground-squirrel the authors estimated that there were 112 adults to the acre or 70,000 to the square mile, and that these would consume in one day more than two tons of green forage, which would be sufficient to feed ninety head of cattle during the same time.

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BIRD-LOVERS will read with no small pleasure Mr. J. H. Gurney's ornithological notes from Norfolk for 1919 in *British Birds* for March. Perhaps the most interesting of these notes are those referring to the bittern, which seems to be returning to the Broads in increasing numbers to breed. It is satisfactory to learn that, so far as can be ascertained, this year no nests were raided, though in one nest the brood, unfortunately, died. The little owl, he tells us, which up to 1914 was confined to a few districts in the west of the county, is quickly spreading throughout the whole of Norfolk. The prevailing prejudice against this bird he considers scarcely to be justified, since "the test of dissection is rather in its favour than otherwise." During the war vast quantities of a tar-like substance were spread over much of the North Sea for military reasons. One would have imagined that the need for this had now ceased, but in these notes are records of numerous divers and guillemots picked up in an exhausted condition owing to this compound clogging the plumage.

IN the fourth part of his study of the Malacostracous Crustacea obtained by the *Ingolf* and other Danish expeditions from deep water in the seas round Iceland and South Greenland ("The Danish *Ingolf* Expedition," vol. iii., part 6, Copenhagen, 1920), Dr. H. J. Hansen describes the Cumacea and Phyllocarida. Of the former group no fewer than sixty-six species are enumerated, of which twenty-four are new—a surprisingly large proportion of novelties in view of the attention that has been given by G. O. Sars and others to the Cumacea of northern waters. Together with Dr. Hansen's previous memoirs on the Isopoda and Tanaidacea, this report serves to bring into prominence both the extraordinary richness of the micro-fauna of the sea-bottom and the imperfection of our knowledge of it even in the better-known regions of the ocean. From the point of view of systematic zoology, if not also from that of marine bionomics, a one-sided impression is apt to result from confining attention mainly to the more easily studied species of the plankton. In dealing with the Phyllocarida Dr. Hansen is able to throw new light on the structure of the limbs and mouth-parts of the long-known and much-studied *Nebalia*.

IN the March issue of *Medical Science: Abstracts and Reviews* (vol. i., No. 6), one of the reviews is devoted to the subject of typhus fever. Owing to the war this disease has been very prevalent in Europe during the last four years; for example, in Poland 124,620 cases were recorded between January 1 and July 27, 1919. Lice are the agents by which the disease is transmitted, but the causative micro-organism is still unknown. The blood-serum gives agglutination with a *Proteus* bacillus, the Weil-Felix reaction, which is of considerable value for the diagnosis of the disease.

AN interesting lecture on the history of electrotherapy by Dr. W. J. Turrell is published in the *Archives of Radiology and Electrotherapy* for February (No. 235). In England electrical treatment appears to have been first practised by the clerical profession.

In 1756 a book on the subject was published at Worcester by Richard Lovett, a lay clerk at the cathedral, in which he records the treatment of a number of diseases with electricity. In 1780 John Wesley, the great divine, anonymously published a book entitled "The Desideratum; or, Electricity made Plain and Useful." In this he appeals to the medical profession for a trial of the curative effects of electricity, and records many alleged cures.

WE have received the first number of a new British journal devoted to pathology, entitled the *British Journal of Experimental Pathology*. It is published bi-monthly under the editorship of a board of editors by Messrs. H. K. Lewis and Co., the annual subscription, post free, being 2l. The journal has been founded for the publication of original communications describing the technique and results of experimental researches into the causation, diagnosis, and cure of disease in man. Among the contributors to this first number are Prof. Bayliss ("Is Hæmolysed Blood Toxic?"), Dr. Cramer ("On Sympathetic Fever and Hyperpyrexial Heat-stroke"), Prof. McIntosh and Mr. Smart ("Determination of the Reaction of Culture Media"), and Mr. Fildes ("Sero-logical Classification of Meningococci"). The journal is well produced, and will, we believe, fill a lacuna in the means of publication of research work at the disposal of British pathologists.

MR. W. L. GEORGE, who gave evidence before the National Birth-rate Commission, has contributed to the *Fortnightly Review* for March a summary of the arguments he presented to that body, which does not appear yet to have arrived at a conclusion upon them. The line he takes is that a high birth-rate corresponds with a low degree of education, a low level of comfort, and poor foreign trade. He views, therefore, with calmness, and, indeed, with satisfaction, the recent decline in the birth-rate, and would take active steps in that direction by promoting the understanding of contraceptives and other preventive measures. Whether this could be done without leading to grave evils may be doubted. At any rate, Mr. George is justified in opposing proposals tending in the other direction, such as those for the endowment of motherhood, which would have the effect of encouraging imprudent marriages or illicit connections, and, as they involve an expenditure that he sees is financially impossible, must fall to the ground. He would have us base our quest for national prosperity on good births rather than on more births, on quality rather than on quantity. Like all difficulties that arise out of the passions and the instincts of mankind, the problem is soluble only by an appeal to reason and by a gradual education of the will in men and women. It should be noted that large families have given to the community many valuable members.

A SUPPORTING expedition for Roald Amundsen's trans-polar voyage has been organised by the Norwegian State. Some details from Scandinavian sources are published in *La Géographie* (vol. xxxiii., No. 1). The expedition which reached Greenland last summer is in charge of Lieut. G. Hansen, a Danish naval officer who accompanied Amundsen in the

voyage of the *Gjoa* in 1903-5. Lieut. Hansen is now wintering at Etah, in about $78^{\circ} 15'$ N. This month he hopes to leave with a dozen sledges for Cape Colombia, the most northerly point of Grant Land, in 83° N. Stores and provisions for a year will be taken. Amundsen, who proposes to leave his ship, the *Maud*, at the most northerly attainment of its drift, is expected to make for Cape Colombia, and may arrive there in March, 1921.

At a meeting of the Royal Geographical Society on March 8, a paper was read by Miss E. M. Ward on "The Evolution of the Hastings Coast-line." We can scarcely agree that the Wealden dome stretches from Beachy Head to the North Foreland, as it does not extend beyond the Warren at Folkestone, where the chalk of the North Downs comes down to the sea, or that the North Foreland is in the Channel, as we might be led to believe. It may be pointed out that the eastward-flowing drift of flint beach is general on the South Coast, and that this has resulted in most of the southern-flowing rivers being turned to the east, whilst forming a spit of beach on the seaward side of the stream, this being the result of the conflict between the eastward-flowing tide and the southward-flowing stream. As the streams lost their velocity and carrying power they deposited their silt, and finally the conflict between sea and mud ended in the victory of the former, when the sea made its bold attack on the land, which is still going on, and against which engineers are fighting. The existence and continued growth of Dungeness have never yet been satisfactorily accounted for, but there is some reason to believe that the destruction of the Hastings headland let loose vast quantities of beach which had accumulated on its western side, and that this gave rise to the various low terraces still to be observed on the west side of the Ness. Miss Ward finds it difficult to believe that at Hastings there was a promontory in Neolithic times even so much as seven miles in length, but it is fairly generally believed that the passage between England and France was comparatively narrow in those times, and Prof. Boyd Dawkins even suggested that Neolithic man came across on dry land.

IN the Proceedings of the American Academy of Arts and Sciences (vol. lv., December, 1919), Messrs. George F. McEwen and Ellis L. Michael deal with the functional relation of one variable to each of a number of correlated variables when the representation by linear regression is unsatisfactory. The basal idea is to assume that the dependent variable may be represented by a sum of functions of the independent variables, and to determine these functions by dissection of the material into a series of groups. If, for instance, a variable w is to be expressed in terms of x , y , and z , a series of groups of (w, x) , (w, y) , and (w, z) are formed; a first approximation to the relation between w and x is obtained by taking the averages of the (w, x) groups; corrections are then derived from the averages of the (w, y) and (w, z) groups; from the second approximations third approximations are derived, convergence being ob-

tained to the values of w corresponding to variations of x alone. Similarly the other functional relations are obtained. The idea of defining a function by means of a series of corresponding values has been utilised by various mathematicians; the most obvious criticism of its statistical applicability is that an immense amount of arithmetic would be required to determine more than a very small number of corresponding values. The method, however, deserves further consideration.

THE *Meteorological Magazine*, an official publication of the Meteorological Office, was first issued under its new title about the middle of February. The journal incorporates *Symons's Meteorological Magazine* and the *Meteorological Office Circular*. For convenience in reference, the serial numbers of *Symons's Meteorological Magazine* are being carried on. The change has come about through the absorption of the British Rainfall Organization in the Meteorological Office. The cover of the new publication gives the portraits of four pioneers of meteorology, all of whom were associated with the Meteorological Office. Of these Admiral FitzRoy had charge of the Office at its initiation, when it was a branch of the Board of Trade, and Mr. Symons was an assistant sixty years ago, but left after a short period and devoted himself to the collection of rainfall returns, from which evolved later the British Rainfall Organization. Gens. Sabine and Strachey were successively chairmen of the Meteorological Office when controlled by the Royal Society. Little change has been introduced into the style and character of the publication, and it is evidently not intended to make any radical alteration. In addition to the interesting article on "Weather in the British Isles" for the preceding month, which has hitherto regularly appeared in *Symons's Meteorological Magazine*, an article is now given on "Weather Abroad" which will doubtless be valued by readers of the journal.

ON March 10 Lord Moulton delivered a lecture at University College on "The Training and Functions of the Chemical Engineer." The lecture was presided over by H.R.H. Prince Arthur of Connaught. Lord Moulton referred to the great importance of securing an adequate and suitable training for those who had to perform chemical operations on a large scale. In a research chemical laboratory work is carried out on small quantities of pure substances with every convenience at hand and regardless of cost and economy. In chemical industry, on the contrary, it is necessary to carry out operations on vast quantities of impure substances with no conveniences and with the greatest possible regard to the matters of cost and economy. The question of change of scale was all-important, since it was extremely difficult to secure on a large scale that uniformity of conditions easily obtained in a research laboratory and fundamental for the success of the operation. Lord Moulton laid great emphasis on the subject of costing and costs, since, as he pointed out, the success of an industrial

operation in the real world of chemical industry, as compared with the success of a chemical operation in the ideal world of the research laboratory, depended entirely on its cost. It was a noble and dignified business to make things cheaply so that they could be utilised by large numbers of people. In conclusion, Lord Moulton referred to the fact that the Ramsay Memorial Committee had given 25,000*l.* for the building of a laboratory of chemical engineering at University College. He earnestly hoped that the further sum of 50,000*l.* which was required would be forthcoming. A vote of thanks to Lord Moulton for his interesting lecture was proposed by Prof. F. G. Donnan, who referred to the great work Lord Moulton had done during the war as Director-General of the Explosives Supply.

Mr. James Thin, 54 South Bridge, Edinburgh, has just issued a useful and comprehensive catalogue of new and second-hand books on technical and scientific subjects. The prices named in the second-hand section are very reasonable. A laudable feature of the catalogue is the giving of the dates of publication of the volumes.

THE Oxford University Press will shortly publish an English rendering, by H. L. Brose, of "Space and Time in Contemporary Physics: An Introduction to the Theory of Relativity and Gravitation," by M. Schlick, with an introduction by Prof. F. A. Lindemann. The work is intended for the general reader. It deals with the problem of the structure of cosmological space, discusses the relation of psychological to physical space, and analyses the significance of measurements in physics.

THE *Reader's Index*—a bi-monthly magazine issued by the Croydon Public Libraries—for March and April contains much useful guidance for readers, including a reading list of books and periodical articles on the Einstein theory. We notice references to articles in *NATURE* of June 11, 1914; December 28, 1916; March 7 and 14, 1918; November 13, 1919; and December 4, 11, and 18, 1919.

A NEW series of books dealing with the textile industries has been arranged for by Sir Isaac Pitman and Sons, Ltd. The editor will be Prof. R. Beaumont, and one of the first volumes in the series to be published will be that by the editor on "Union Textile Fabrication," which will contain three main divisions dealing respectively with bi-fibred manufactures, compound-yarn fabrics, and woven unions. Another volume in the series will treat of "Flax Culture and Preparation." It will be the work of Prof. F. Bradbury.

MR. D. N. WADIA writes to say that the two illustrations from his "Geology of India" reproduced in *NATURE* of January 15 were not his own photographs, but from the collection of negatives at the offices of the Geological Survey at Calcutta. Acknowledgment of this was, unfortunately, omitted from the book, and our reviewer assumed, therefore, that the photographs were the author's.